

ADDITIONS TO THE DRAGONFLY (ODONATE) FAUNA OF  
INDIA WITH DESCRIPTIONS OF NEW SPECIES.

BY

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(With 4 text-figures).

During the past three years considerable material has been sent to me by Messrs. H. V. O'Donel, Chas. Antram and Capt. Cardew and this has been further added to by collections made by myself in the Western Ghats. I have to thank these collectors through whose disinterested efforts so much has been added to our knowledge of the dragonfly fauna of India.

Amongst this material quite a number of new species have come to light of which nine have already been described by myself in the Records of the Indian Museum, Vol. xxxiii, pp. 443-474 (1930), but other new ones yet remain to be described as well as new records to be given. In the present paper I have furnished descriptions of two new species as well as those of two females which were hitherto unknown. I am also able to give amended descriptions of rare or little known species whose original descriptions were faulty or imperfect owing to their having been made from teneral or imperfect specimens.

AMPHITHEMIS VACILLANS Selys.

From the Maraghat Forest, Duars, Bengal, Mr. O'Donel has secured a male specimen of that great rarity *Amphithemis vacillans* Selys, and as the insect is fully adult, I am now able to give its mature colouring.

The type as well as the cotypes were subadult and are described as having the thorax yellow and the abdomen with yellow markings; in the specimen before me there are no traces of such, the whole insect is glossy coal-black including the thorax, abdomen and legs. Segments 2 and 3 of the abdomen are pruinose chalky white on the dorsum and sides with the exception of a small uncovered cordate area on the dorsum at the apical border and the middorsal carina on segment 3 which is finely black. All wings are tinted with pale yellow at the extreme base only; the venation is as given by Dr. Ris except that there are two traversing nervures in all the bridges and one of the discoidal cells in the hindwing is traversed once.

The white basal abdominal segments compare with the red ones of *A. maria* Laid., and are evidently recognition sexual markings in both species. The type comes from Bhamo, Burma; the present specimen was taken on 24-10-31.

CAMACINIA GIGANTEA Brauer.

Originally described from Amboina, the only record for the Indian Empire was Burma. Mr. Chas. Antram has now discovered this insect at Nowgong, Assam and has sent me some 17 males and a female. The males are all adult and they differ slightly from type by the basal coloured portion of wings extending distad the endings of *IA* and *MA*. The brown fascia also is continued outwards as far as the apices of wings limited posteriorly by *Rii*. The species is apparently common at Nowgong.

MACROMIA MINIATA Fraser.

Amongst the material collected by Mr. H. V. O'Donel in the Duars are five specimens of *Macromia miniata* Fras. The discovery of this species so far north comes as a great surprise as it was hitherto unknown outside the small province of Coorg. The female was unknown, and as two of the Duars specimens belong to this sex, I am now able to furnish its description:—

Female.—Abdomen 43 to 45 mm. Hindwing 38 to 40 mm.

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<sup>1</sup> Received for publication on 16th. August, 1932.

Resembles the male closely in colour and markings, differing only by the stouter and more evenly cylindrical abdomen. The labrum in both specimens is bright citron yellow at the base, thus differing from the type male; there is also a large spot of the same colour on the bases of mandibles. Markings of thorax and abdomen are exactly similar to the male. Wings saffronated at extreme base and the whole more or less deeply enfumed brown. In one specimen this brown takes the form of a net-work corresponding to the wing reticulation, the cell-middles being hyaline and uncoloured. One specimen has an incomplete basal antenodal nervure in one of the forewings, a structure rarely seen in the genus; nodal index.— $\frac{7-15}{10-11} \left| \frac{15-7}{11 \ 10} \cdot \frac{6-18}{8-11} \right| \frac{17-7}{12 \ 9}$ .

*Distribution*.—Huldibari Tea Estate, 20-7-31 and 7-8-31, and 8-5-32. One of the males has the labrum bright yellow at the base but apart from this, is true to type including the genitalia.

TETRACANTHAGYNA WATERHOUSEI MacLach.

Male.—Abdomen 55 mm. Hindwing 50 mm. Anal appendages 6 mm.

Head.—Labium warm brown; labrum, clypeus and anterior surface of frons olivaceous green tinged with ochreous below, upper surface of frons blackish brown, behind eyes yellow. Head of enormous size, eyes globular and very broadly contiguous, occiput nearly obsolete, frons slightly elevated.

Prothorax and thorax blackish brown marked with bright greenish yellow as follows:—oblique antehumeral stripes converging strongly and pointed above, a small yellow point near the middle line and close to the antehumeral sinus, two lateral oblique, rather narrow stripes, the anterior parallel and close to the humeral suture, the posterior broader, covering the middle of the metepimeron; small yellow spots on the coxae and some on the tergum. Legs black but the proximal three-fourths of all femora reddish brown.

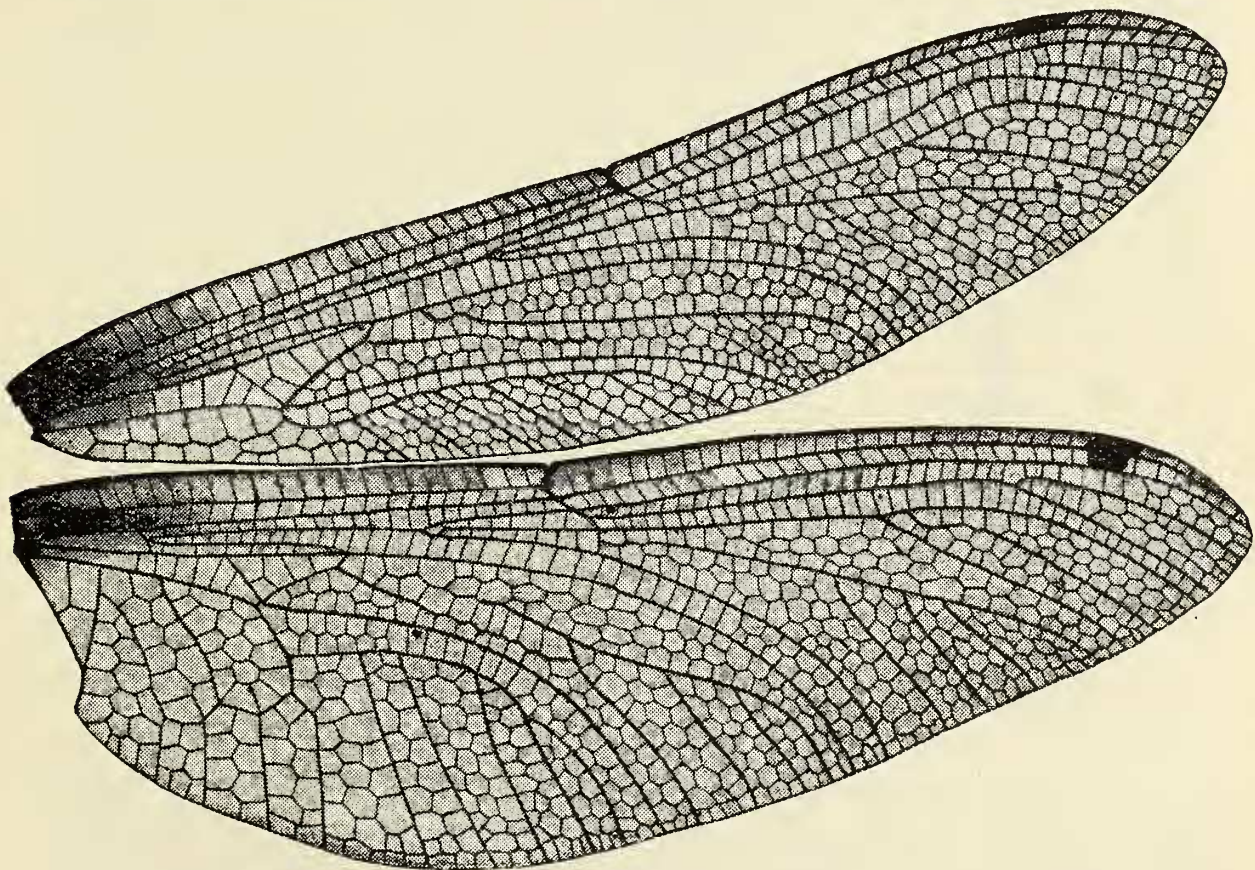


FIG. 1.—Wings of *Tetracanthagyna waterhousei* ♂ MacLach.

Wings hyaline, enfumed dark uniform brown in one very adult male, and in all, bearing a diffuse dark brown ray in the costal, subcostal and median spaces near the base, gradually fading out towards the discoidal triangles.

The hindwing 16 mm. broad at the level of the inner end of bridge, base of same wing rather contracted and oblique, tornus moderately prominent. Discoidal triangles 6 to 8-celled in the forewings, 5 in the hind; 6 to 7 cubital nervures in forewings, 5 to 7 in the hind; anal loop 12 to 17-celled; hypertriangles traversed 7 times in the forewings, 5 to 6 in the hind; anal triangle 3-celled; a well-developed supplement to the discoidal triangles; 3 to 4 rows of cells between the forking of *IRiii* and *Rspl* and *MA* and *Mspl*; 3 to 5 rows of cells between the forks of *IRiü*; nodal index.—  $\frac{23-31}{26-19} \left| \frac{28-23}{22-27} \right. \quad \frac{21-27}{24-19} \left| \frac{29-22}{19-22} \right.$

pterostigma of forewing covering 3 cells, short, distal and proximal sides oblique, 3 times as long as broad; that of hindwing shorter, only  $2\frac{1}{2}$  times as long as broad and with the two proximal cells beneath it opaque brown so that the pterostigma looks irregularly quadrate; membrane white, very short.

Abdomen black; segments 2 to 8 with narrow basal blue annules and a pair of narrow dorsal green apical lunules; segment 1 reddish; segments 9 and 10 unmarked, the former segment with a robust spine terminating the middorsal carina at apex, the latter with a robust dorsal keel. Oreillets small but prominent, greenish yellow on dorsum margined with a row of minute teeth.

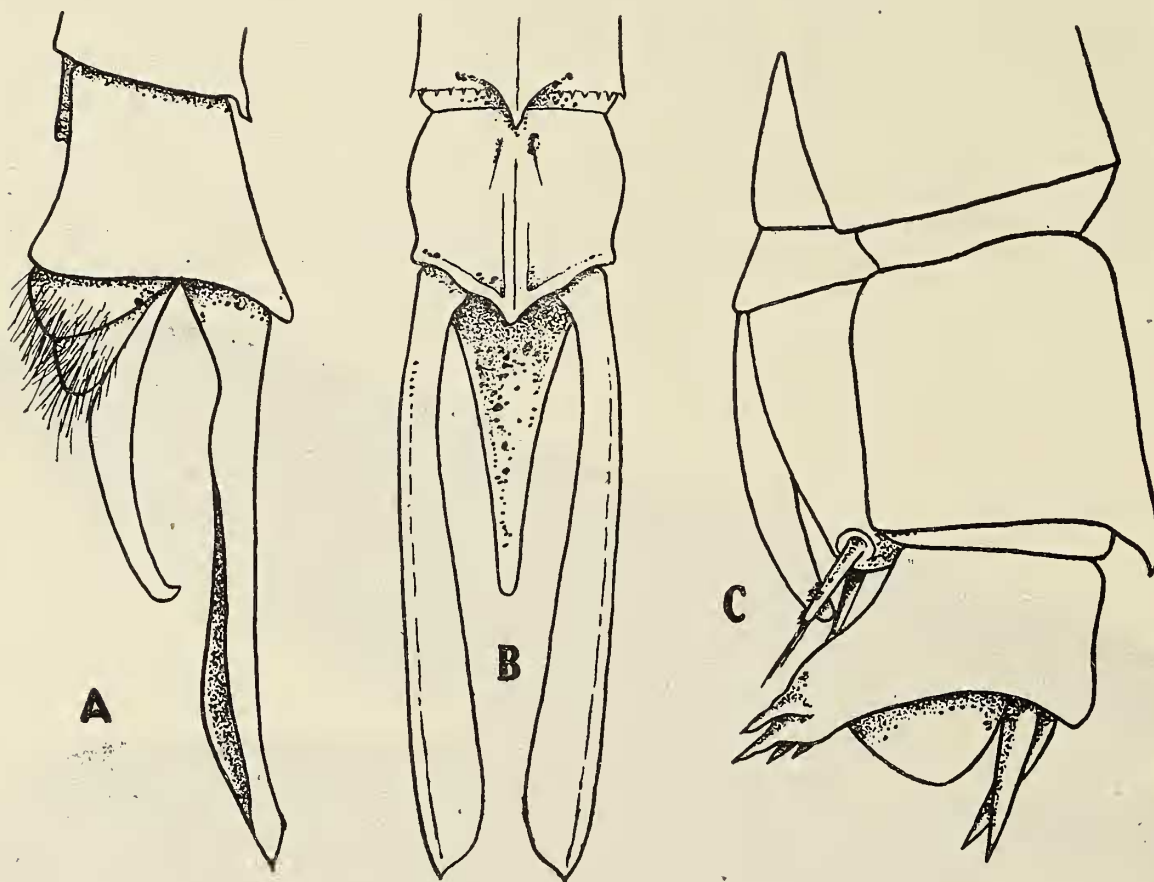


FIG. 2.—(A) Anal appendages of *Tetracanthagyna waterhousei* MacLach. ♂ viewed from the left side. (B) Anal appendages seen from the dorsum of same ♂. (C) Terminal segments, dentigerous plate and ovipositor of same ♀.

Anal appendages black; superiors as long as segments 9 and 10 taken together, narrow, lightly constricted near base, after which is a small ventral dilatation, apices ending in a minute outer spine and broadened slightly; a keel running the whole length of appendages parallel to and near the outer border; inferior appendage narrowly triangular, apex curved up, hollowed out beneath, rather more than half the length of superiors.

Female.—Abdomen 52 mm. Hindwing 56 mm.

Similar to the male in colour and markings but the basal segments of abdomen dark reddish brown at their middles. Differing by the shorter stouter and more cylindrical abdomen which tapers as far as segment 7 and then

dilates again towards the anal end, the end segments being markedly compressed. Segment 9 with a similar apical dorsal spine, segment 10 produced below to form a robust genital plate which is usually furnished with 4 stout spines (but in one female 6 are present); ovipositor very robust, ending just prior to the genital plate; anal appendages cylindrical, pointed at end.

Wings similar to the male but in some, a distinct broad pale brown fascia crossing both wings at the level of the pterostigma, which latter is longer than in the male and has not the opaque cells beneath it in the hindwing noted in the case of the male; nodal index.—  $\frac{24-29}{24-18} \mid \frac{31-22}{19-24}$ ; 6 to 7 cells in discoidal triangles of forewing, 5 in the hind; 6 to 7 cubital nervures in forewings, 6 in the hind; anal loop 15 to 16-celled; other details similar to the male.

*Distribution*.—Maraghat Forest, Duars, Bengal. Three males and two females taken by Mr. H. V. O'Donel. Mr. O'Donel states that this insect is crepuscular in its habits, coming out in forest well after sunset and continuing flying until it is too dark to see them. He has however seen them during the day, when they are fairly common in heavy forest but are difficult to catch as they fly very high until it grows darker, when they descend to within reach of the net. This species is synonymous with *Taoaeschna fontanalis* Förster and also with *Aeschna quadrilateralis* mihi, the latter described from an incomplete specimen with the terminal five segments missing. The present specimens differ from type by their much smaller size and also by having the labrum greenish yellow instead of black. Mr. D. E. Kimmins of the British Museum informs me however that this latter feature may be due to postmortem changes, after having made a re-examination of the type. The unique shape of the pterostigma in the hindwing of the male and its variability from that of the forewing, and all wings of the female was not commented on in the original description. The type comes from Borneo and this is the first record of the genus from Indian limits.

The shape of the genital plate in *Tetracanthagyna* is clear proof that the female deposits her eggs in dry earth after the manner of *Gynacantha* and *Aeschna erythromelas* Mac L., and in view of the shape of the genital or dentigerous plate of the latter, totally different from the same structure found in genus *Aeschna*, it seems preferable that *A. erythromelas* should be given generic rank and for this I propose the name of *Polycanthagyna*. *Tetracanthagyna*, *Triacanthagyna*, *Platacantha*, *Gynacantha*, *Polycanthagyna* and perhaps *Cornacantha* form a group characterized by the specialization of the dentigerous plate of the female which is fitted to enable the insect to oviposit in dry soil; most of the known species are moreover crepuscular in habit; probably all will be found to be so when we have learnt more concerning their habits.

#### AESCHNA PETALURA Martin.

The capture of two specimens of this rare insect, of which the male still remains unknown, enables me to give its full colouring, as one at least, has preserved its original markings with exceptional beauty.

Face olivaceous; frons bright yellow above but brownish black towards and at the base, this brown passing forwards in the sulcus to join the brown on front of frons. (The T-mark noted by Martin is not especially noticeable in these specimens.) Occiput yellow.

Prothorax and thorax warm brown marked with azure blue; short, thick antehumeral stripes not extending the whole length of dorsum and gradually broadening below, the antealar sinus, spots at the bases of wings and along middle of tergum, and lastly two broad lateral stripes, the latter of which covers most of the metepimeron. Legs black, bases of femora reddish brown.

Wings hyaline, tinted with brown throughout except for a space at the base, the outer margins of which fall just distad the discoidal triangles and loop, the brown colour densest on the nervures, the cell-middles clear. Anal loop with 10 to 12 cells; nodal index.—  $\frac{11-21}{14-15} \mid \frac{20-13}{13-15} \cdot \frac{12-18}{12-12} \mid \frac{16-12}{12-14}$  pterostigma short, covering 2 to 3 cells, dark brown, braced; *IRiii* forked well before the level of pterostigma and with 2 to 3 rows of cells between it and *Rspl*.

Abdomen dark brown marked with bright grass-green as follows.—segment 1 with a middorsal triangular spot, broadest at the apical border of segment, the sides also broadly green; segment 2 with a middorsal stripe extending from the dorsal spot on segment 1 and tapering to a point which ends short of apical border of segment, a pair of green lunules on the apical side of jugal suture, the sides broadly green and a pair of azure blue apical lunules; segments 3 to 7 with a tiny middorsal basal triangular green spot, a pair of large lunules bordering the jugal suture distally and a pair of apical lunules; segment 8 with the apical lunules only; segment 9 with a large oval spot on each side, whilst segment 10 is unmarked; all segments from 3 to 8 have also a large latero-basal spot of green.

Anal appendages dark brown, shaped like the paddle of a canoe; vulvar scales broad and massive; dentigerous plate rounded below, typically Aeschnine in shape, coated with numerous minute spines beneath.

Two females collected by C. M. Inglis at Phulloth, Sandakhpura, Sikkim, 11,500 ft. 16-10-28. The enormous altitude at which these were taken perhaps constitutes a record for dragonfly life, although Mr. T. B. Fletcher has picked up a dead *Aeschna mixta* above the snow line in Kashmir; it was actually lying dead in the snow!

CHLOROGOMPHUS OLYMPICUS sp. nov.

Male.—Abdomen 55 mm. Hindwing 40 mm.

Head.—Labium pale ochreous; labrum olivaceous changing to dark brown outwardly and with a minute black medio-basal point; anteclypeus greenish; postclypeus and frons bright grass-green, the former narrowly margined with blackish brown below, the latter with a narrow blackish brown stripe shaped like a cupid's bow lying midway between the crest and lower border of frons; the base of frons above dark reddish brown; vertex and occiput black, the latter fringed with long golden hairs.

Prothorax black with a small spot on each side and the narrow posterior lobe bright yellow.

Thorax black marked with bright greenish yellow as follows:—narrow antehumeral stripes, pointed below but greatly broadened above and converging so as to be separated only by the narrow black middorsal carinal suture; laterally two moderately broad stripes, one on the mesepimeron, the other covering most of the metepimeron; between these two a small but conspicuous upper spot; beneath brown marked with a mid triangle of black. Legs black, coxæ pale brown.

Wings hyaline, narrow; pterostigma black, covering 2 to 2½ cells; discoidal triangles of similar shape in fore and hindwings, usually entire but occasionally traversed once in the forewings; supratrangles traversed twice, occasionally three times in the forewings; 6 to 7 cubital nervures in the forewings, 5 in the hind; 1 median nervure to all wings; a single row of cells between the origins of *IA* and *Cu<sub>1</sub>* in the hindwing; anal triangle 3-celled; nodal index.—

$$\frac{9-18}{12-12} \mid \frac{19-9}{14-11}$$

Abdomen much longer than wings, tumid at base, constricted at segments 3 and 4, then dilated again at base of 4 but still narrow and triquetral in section till the anal end. Coloured black marked with bright citron yellow as follows:—segment 1 clothed thickly with yellow hairs, a yellow spot on dorsum, a smaller one at each side and a narrow apical line on the sides; segment 2 with the small oreillets yellow, a pair of postjugal triangular spots narrowly separated on the dorsum, but narrowly confluent with a pair of very large apical lunules which are confluent over the dorsum, the posterior two-thirds of the ventral border narrowly yellow and a prolongation from this yellow running up the margin of the segment to become confluent with the apical lunules (A large black fleur-de-lis is thus cut off and enclosed by the yellow on the dorsum of segment); segment 3 with a pair of large apical lunules broadly confluent over the dorsum, a pair of small triangular spots lying just basad the jugal suture and separated by it from a pair of elongate triangular postjugal spots which extend nearly to the apical lunules; segments 4 and 5 with a pair of postjugal triangular spots and a pair of broadly con-

fluent apical lunules; segments 6 and 7 with rather broad apical rings slightly indented by the black on middorsum; segments 8 to 10 with very narrow apical rings confluent below with a narrow ventro-lateral stripe, the ring on segment 10 interrupted above and also invading the black subdorsally.

Anal appendages black, of equal length; superiors twisted on themselves longitudinally as seen in profile, shallowly bifid at apex, and with a robust ventral spine at mid length; gently curved towards one another as seen

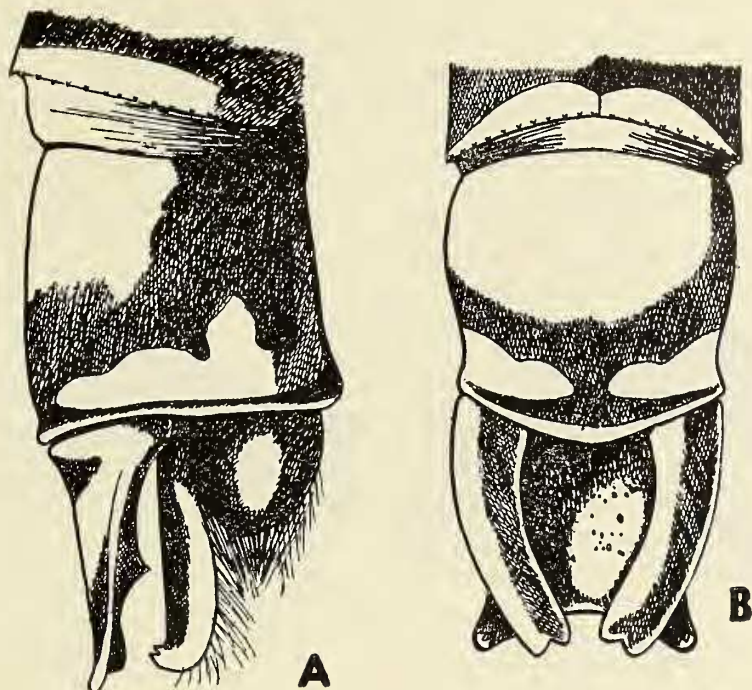


FIG. 3.—Anal appendages of *Chlorogomphus olympicus* sp. nov. ♂. (A) viewed from the right. (B) viewed from the dorsum. (Drawn from the type.)

from above; inferior rather broadly and shallowly notched at apical border, the outer angles turned up and ending in a pair of minute spines. Female unknown.

*Distribution*.—Kufri, Simla States, 8,400 ft. 9-6-29. A single male, the type, now in the author's collection, taken by Capt. Cardew. This species belongs to the *atkinsoni-selysi* group and is readily distinguished by the broad extent of the abdominal markings, it being the only known species in which segments 9 and 10 are marked. Other distinguishing features are the entire discoidal triangles, the bright grass-green face, the frons with the highly characteristic cupids-bow stripe at its mid front aspect, etc. Seven species are now known from within Indian limits.

#### ANAX IMMACULIFRONS Rambur.

A single male collected by Capt. Cardew in the Kangra Valley, 29-4-30. Although common in the Western Ghats and Ceylon and less so in parts of the Agency Tracts, this insect is extremely rare in the north, the present occurrence being the third only which has come to my notice. It differs in no respect from southern specimens.

#### MESOGOMPHUS LINDGRENI Fraser.

Mr. O'Donel has taken two more males of this beautiful species known hitherto only from a single male taken at Turzum, Darjeeling District. In comparing these two specimens with the type I note that the dorsal black markings enclose inverted figures of 7 of the green ground-colour and that this is true also for the type. In the figure given on Plate II, Journ. Bom. Nat. Hist. Soc., Vol. xxix, facing page 1001, the ground-colour is shown, in error, interrupted. One of Mr. O'Donel's specimens has preserved its original colours almost perfectly and it is to be noted that this is a beautiful grass-

green with jet-black markings. Another important feature comes to light, and that is the presence of an incomplete basal antenodal nervure in all wings. This is constant in all wings of all three specimens and as this character is quite unknown in all other species of the genus, it forms an important guide to identification. One of the three specimens will be deposited in the British Museum.

COELICCIA DOROTHEA sp. nov.

Male.—Abdomen 35 to 38 mm. Hindwing 22 to 23 mm.

Head.—Labium pale yellow; labrum glossy black as also the ante- and post-clypeus; bases of mandibles, genae and a streak running inwards on the frons but not confluent across the middle line, azure blue; rest of head black marked with a small oval spot of blue on the outer side of the ocellar space and a pyriform blue spot on each side of the occiput.

Prothorax black with a large azure blue oval spot on each side the middle lobe; posterior lobe large, trilobate.



FIG. 4.—a. Thoracic markings of *Calliccia dorothea* ♂ sp. nov.  
b. Thoracic markings of *Calliccia dorothea* ♀ sp. nov.

Thorax black on dorsum marked with a large azure blue oval spot on the anterior or lower half; laterally azure blue with a narrow black stripe on the postero-lateral suture broadening forwards above and more so posteriorly below; beneath pale blue to white, the black of sides encroaching on the anterior part.

Legs white, femora black on flexor and extensor surface, tibiae on the flexor surface.

Wings hyaline, palely enfumed in old specimens; pterostigma black framed in thick black nervures which are margined inwardly with white or palest brown, nearly quadrate but the sides oblique, covering  $1\frac{1}{2}$  cells; *Riv+v* arising at the level of the nervure descending from the node, *IRiii* well distad of that level; 16 to 18 postnodal nervures in forewings, 16 to 17 in the hind. (In one male only does *Riv+v* arise slightly proximal to the subnodal nervure.)

Abdomen black marked with azure blue or white as follows:—segment 1 broadly white laterally, this extending on to dorsum along the apical border; segment 2 similar but the apical extension cut off to form a pair of small subapical subdorsal blue spots; a fine middorsal carinal white line extending from base for half the length of the segment; segments 3 to 6 with a pair of subapical subdorsal spots; segments 7 to 9 unmarked; segment 10 creamy white except for a small dorsal basal triangular black spot.

Anal appendages creamy white, subequal; superiors but a shade longer than inferiors, unguulate and pointed obtusely at apex, with a broad ventral spine which ends in a minute black point directed backwards; inferiors forcipate, broad at base, then cylindrical and very sinuous, the apical portions turned strongly in and blunt at apex which however has a minute black point at its extremity. Penis not differing markedly from that of *C. albicauda* Forst., broad at apex, with a spine below the curled over portion, which latter is bifid, its two long branches curling strongly downward to embrace the stem of organ.

Female.—Abdomen 32 to 34 mm. Hindwing 22 mm.

Differs in several respects from the male.

Head.—Labrum yellow suffused with blackish brown at base; bases of mandibles, genae and the prolongation inwards on the frons yellow, the latter narrowly confluent across the middle line; ocellar blue spots prolonged as a zigzagged stripe as far as eyes including the penultimate segment of antennae; posterior occipital spots yellow. Prothorax almost entirely yellow with a narrow anterior collar and the posterior lobe black, the latter lobe much aborted, almost obsolete. Thorax black on dorsum with rather broad, strongly curved azure blue antehumeral stripes extending for nearly the whole length of dorsum; laterally pale blue with a very fine black line on the postero-lateral suture incomplete below. The blue ground colour invading the dorsal black above near the antealar sinus; beneath pale yellow, unmarked. Legs yellow marked as in the male. Wings not differing in any respects from those of the male.

Abdomen black marked with pale yellow or blue; segment 1 broadly yellow, its dorsum rather narrowly black; segment 2 similar to the male but the subapical spots confluent with the yellow on sides; segments 3 to 5 with paired subapical spots confluent with the yellow on the sides; segments 6 to 7 unmarked; segment 8 with its apical half pale blue, the basal black projecting as a strong point into it on the middorsum; segment 9 entirely pale blue on dorsum, this blue narrowing gradually from base to apical border; segment 10 and the short conical anal appendages black; vulvar scales yellow tipped with blackish brown, very robust.

*Distribution*.—Huldibari Tea Estate, Duars, Bengal. Five males and two females collected by Mr. H. V. O'Donel, 30-8-31 and 30-10-31.

Laidlaw in his recent monograph on the genus (*Rec. Ind. Mus.*, Vol. xxxiv, pp. 7-42, 1932) has split up the genus into 3 groups by the relationship of *Riv+v* and *IRiii* to the nervure descending from the node, and these groups are further subdivided by the number of cells existing between the outer end of the discoidal cell and the nervure descending from the node. This new species falls into Group 3 and into the last category of that group where only 2 cells are found between the discoidal cell and the subnodal nervure. Only one other species, *C. albicauda* Forster, is known to belong to this group-section and from it *C. dorothea* is easily distinguished by the presence of a single pair of blue dorsal thoracic spots instead of two pairs as in *C. albicauda*. Moreover the spot is broadly oval and large instead of small and triangular; segment 10 in the male is entirely creamy white instead of black marked with white; the prothorax has the black more extensive in the male but less so in the female; the female is distinguished by the broad blue antehumeral stripes as well as by the dorsum of segment 9 and the apical half of 8 azure blue. That the two species are closely allied however is clear from the positions of *Riv+v* and *IRiii*, as well as by the similarity of the male anal appendages and penile organ. Forster's species comes from the Malay States.

A pair of this beautiful new species will be deposited in the British Museum.

#### AGRIOCNEMIS ARBORENSE Laidlaw.

A pair of this rare insect has been sent me by Mr. H. V. O'Donel from Huldibari Tea Estate, Duars, Bengal, taken on 22-10-31. The female was hitherto unknown and is described below. The type is in the Indian Museum, from Dibrugarh, and I possess specimens from Nowgong, Assam, collected for me by Mr. Chas. Antram.

Female.—Abdomen 22 mm. Hindwing 15 mm.

Head.—Labium white; labrum glossy black narrowly bordered with blue; anteclypeus black; genae, bases of mandibles and post-clypeus azure blue, rest of head black with a pair of large bright blue postocular spots.

Prothorax black with a large blue dorsal spot on the anterior lobe; posterior lobe squared behind.

Thorax black as far lateral as the antero-lateral suture, marked on dorsum with narrow antehumeral azure blue stripes; laterally blue with a narrow black stripe on the postero-lateral suture.

Legs pale yellow, femora broadly black on extensor surface.

Wings hyaline, pterostigma black framed finely in palest brown, covering 1 cell; 9 to 10 postnodal nervures in forewings, 7 in the hind,



Abdomen black marked with azure blue as follows.—Segment 1 with a large spot on each side and a narrow intensely blue apical annule; segment 2 with a narrow lateral stripe, which is shaped like a '?' mark at the apical end; segments 3 to 6 with a long lateral narrow stripe which is interrupted apicad on segment 3; segment 7 with only a basal-lateral spot; segments 8 to 10 unmarked but the intersegmental nodes blue. Anal appendages dark blackish brown, very small and conical; vulvar scale yellow.

Along with these specimens and from the same locality, were representatives of *Agriocnemis femina*, *pygmaea*, *clauseni* and *lacteola* and three species of *Pseudagrion*,—*P. microcephalum*, *P. bengalense* and *P. spencei*. The latter is the rarest of our Indian Pseudagrions and of the four males in this collection, two have a well-marked triangular black dorso-basal spot on segment 8, thus differing from the type in which this segment is entirely blue.

#### ALLOPHAEA OCHRACEA Selys.

Fairly common in the Maraghat Forest, Duars. The specimens are all very small and the males differ amongst themselves in the depth of the black clouding the orange area in the hindwing. The darker varieties might be described as *A. brunnea*, the lighter or paler ones as *A. ochracea*. Collected on 16-8-31.